

October 20th, 2014

To: Tim Carroll and Rodney Bunker, Town of Chilmark
From: Marc Rosenbaum, South Mountain Company

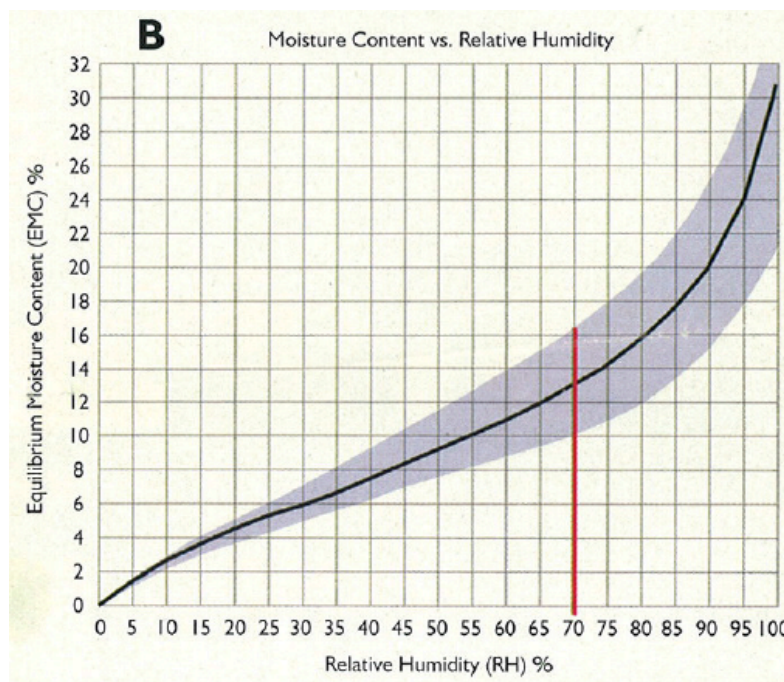
Chilmark Community Center Floor - Progress report

Existing Conditions

The oak strip flooring buckles upward in some locations in the summer season. This is a long-standing issue. The oak is the original floor and is installed over diagonal softwood boards (likely pine). The floor finish is an oil finish, renewed annually, and is in good condition. The building is located in a low area of town with a high water table. Last year the crawl space was isolated from the ground with a heavy duty polyethylene ground cover carefully flashed with closed cell foam into the perimeter foundation and interior block columns. This has dramatically reduced ground moisture transport.

There have been unsuccessful attempts to restrain the floor with screws.

This summer dataloggers were placed in the crawl space and in the main room, which is not conditioned in the summer. The average crawl space relative humidity (RH) in the periods logged from late July through early September was 86%. The average RH in the main space over the same period was 73%, but it is important to note that this was measured about seven feet above the floor. The air temperature right at the floor is likely to be colder, as the floor framing is not insulated and the floor is connected to the crawl space temperature. This means that the RH of the air adjacent to the floor is likely to be higher, and closer to the RH of the crawl space - perhaps as high as 80%. The moisture content of the fir joists is in the 20% range, which is consistent with an equilibrium RH of about 90%. The 16-17% moisture content of the oak flooring is consistent with an equilibrium RH of 80%. A wood moisture sorption curve is reproduced below.



Cleaning the floor is done with a wet mop rather than a vacuum cleaner. Rodney is attentive to avoiding excess water, recognizing that any water adds to the issue. Our flooring subcontractor (W. H. Russell) suggests a floor cleaning machine such as a Dirt Dragon would reduce the wetting of the floor further.

A key piece of information from the monitoring is that the floor sees high RH from both top and bottom, and the dewpoint of the air measured in the main space is equal to the dewpoint of the air measured in the crawl space, so it is unlikely that dehumidifying the crawl space alone will solve this issue. Either the floor needs to see a much lower RH both top and bottom, or it needs room to expand.

Rodney removed a piece of baseboard on each side of the main room to assess if there was any clearance between the edge of the oak floor and the wall plates. None was present. It's possible that there was originally a clearance gap at each side of the floor, but subsequent expansion of the floor has absorbed this gap.

We've been discussing this issue with the best wood science consultant we know, Steve Smulski of Wood Science Specialists. Smulski says that a floor of this size and type would need to be installed with an expansion gap every three to four feet. From this point in time it's impossible to know the original conditions and the installation approach. Any fix will have one of two components. Either:

1 - Air condition the building and dehumidify the crawl space. We think this is not a good solution, as it will be capital and energy intensive, and it will be difficult to maintain a doors and windows closed policy the way the building is used.

2 - Modify the floor to provide the expansion gaps required to absorb the seasonal expansion.

How this would be done would be the subject of further discussion. Smulski advocates removing a strip of flooring every three to four feet (subject to more exact analysis) and replacing with a narrower strip. Others consulted suggest this might be solved by kerfing the floor on similar spacing.

We feel the next steps are to watch the behavior of the floor over the winter as it dries out, periodically measuring moisture content, and trying to assess at what moisture content the buckling subsides. We also would like to get our flooring subcontractor to look carefully at the condition of the floor and assess the thickness remaining above the tongue, so as to predict the remaining service life of the floor. At some point the cost of the proposed fix, once developed, will need to be compared with the cost of replacing the floor completely.